Preliminary Report:

Wildfire Suppression Funding and Costs

Legislative Auditor's Conclusion:

Wildfire suppression costs are shared with other agencies consistent with formal agreements. Accurate and refined data collection is needed to improve information about costs and characteristics.

Executive Summary

The 2016 Legislature directed the Joint Legislative Audit and Review Committee (JLARC) to review how the Department of Natural Resources (DNR) and the State Fire Marshal (Fire Marshal) share costs and secure reimbursements from other public agencies for wildfire suppression. The Legislature also requested that we review how characteristics, including development, land ownership, and insurance, may influence fire costs or reimbursement (2ESHB 2376).

- DNR staff and contractors directly fight fires. Between fiscal years 2010 and 2016, DNR spent $368 million on nearly 11,000 fire incidents, including over 6,800 fires and 4,000 false alarms (Appendix 1).
- The Fire Marshal, which is part of the State Patrol, mobilizes and pays for resources to help local fire agencies suppress large fires. Between fiscal years 2010 and 2016, the Fire Marshal spent $65 million on fire suppression for 93 mobilizations. The process and approval criteria for mobilizations are in Appendix 2.

State, local, and federal agencies work together to suppress fires. Statewide, initial fire response operates on the "closest forces" concept. This means that the closest available resources are dispatched to a fire regardless of which agency they belong to and regardless of which agency has jurisdiction over the land. Multiple agencies may respond to larger fires. JLARC staff analysis found this approach is common nationwide.

DNR and the Fire Marshal appropriately track and share costs with other federal, local, and state agencies

Tracking costs: DNR and the Fire Marshal have procedures in place to track fire-related expenditures sufficient for financial reporting.

Cost sharing: Cost sharing and "no-cost" responses (e.g., mutual aid *(Under mutual aid agreements, agencies help one another at no cost during the initial response)*) are governed by agreements between the agencies. JLARC staff found that for a sample of fires between

fiscal years 2010 and 2016, costs were shared according to the agreements. The cost share can reduce the need for interagency reimbursement because each agency pays a portion directly.

Recouping costs: The state has three ways to recoup expenditures for fires it helps suppress: reimbursement from federal or other state governments, DNR recoveries from negligent private parties (including private insurance payments), and federal fire management assistance grants (FMAG). The total received to date from all three sources is $72 million (fiscal years 2010-16). To date, the state has received partial FMAG reimbursement for fires that took place during the 2014, 2015, or 2016 fire seasons.

Accurate and refined data collection is needed to improve information about costs and characteristics (e.g., development)

Data collection and reporting: The Fire Marshal keeps records of mobilizations, but does not have a system to compile data. DNR has a system to collect fire characteristic data, but many of the data fields are incomplete or inaccurate, and DNR reports limited use of this information. Accurate data collection, for a refined set of data points, is needed to improve information about costs and characteristics such as development.

Incident cost data: While aggregate fire costs and reimbursements appear reliable, DNR lacks an efficient way to identify the costs of an individual fire. DNR's current financial reporting system tracks expenditures by project codes, but each fire may have multiple project codes and the agency does not maintain a central list of all project codes assigned to a fire.

Fire characteristics: Nationally, research has shown a few factors, including land development and housing density, may affect fire costs. These fire characteristics are not typically used to predict or budget for fires, but may inform policy and funding discussions. Literature reviewed by JLARC staff did not cite insurance and land ownership as factors influencing costs, except to the degree that the latter impacts land management decisions. Acres burned is considered a poor indicator of fire costs.

Legislative Auditor recommends improving fire data collection and reporting

The Legislative Auditor makes three recommendations:

1. DNR should refine its collection of key data elements and seek input from the appropriate Legislative committees.
2. DNR should improve the accuracy and reliability of the key data elements it collects.
3. DNR should develop a systematic and verifiable way to identify the costs of individual fires.

You can find additional information on the Recommendations tab

REPORT DETAILS

1. Roles and responses vary

State, federal, and local agencies work together to suppress fires

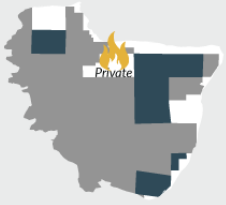
Initial response: The closest available state, local, or federal agency responds, regardless of jurisdiction

Statewide, initial fire response operates on the "closest forces" concept. JLARC staff analysis found this approach is common nationwide. This means that the closest available resources are dispatched to a fire regardless of which agency they belong to and regardless of which agency has jurisdiction over the land. The Department of Natural Resources (DNR) may respond to a fire on federal land, and federal agencies may respond in kind to fires on DNR land. Not all local fire agencies have such arrangements with DNR or federal agencies.

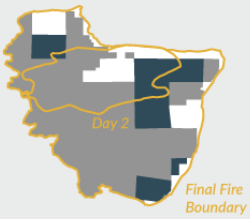
Extended response: Multiple agencies may be dispatched to large fires

If the initial response does not suppress or contain the fire, agencies typically will use an Incident Management Team (IMT). IMT members may come from different jurisdictions. They all are trained and certified to the same national standards for handling fires. The IMT has one incident commander and multiple sections with varying responsibilities. For example, the finance section is responsible for timekeeping and tracking costs, while the operations section directs the firefighters on the ground.

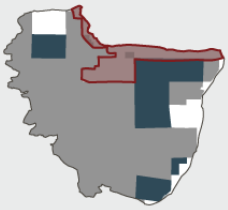
Exhibit 1.1: Levels of response to Mills Canyon Fire, 2014



Initial Response:
Fire started on private land.
DNR responded first.



Extended Response:
Fire across multiple jurisdictions.
DNR, BLM, USFS, local districts responded.
Incident management team used.



State Mobilization:
Resources mobilized to help local fire district in its jurisdiction.

The IMT determines the resources needed to fight the fire. Dispatchers have protocols for the order in which they call resources: closer resources are called before those that are farther away. Large fires often cross jurisdictional boundaries and involve many agencies.

The State Fire Marshal may authorize state mobilization of resources to help a local fire agency with a large fire

If a local fire agency needs more resources to suppress a fire in its jurisdiction, it works with nearby agencies under mutual aid *(Under mutual aid agreements, agencies help one another at no cost)*. If resources beyond mutual aid are needed, the local fire chief can ask the State Patrol Chief to authorize a mobilization, which will be coordinated by the State Fire Marshal (a part of State Patrol). More detail is in Appendix 2.

Under a mobilization, the Fire Marshal coordinates resources to help the district with the fire in its jurisdiction. The state is responsible for the costs associated with fire suppression, including personnel, equipment, and transportation. The Fire Marshal does not directly suppress fires, but does work with the IMT. A mobilization ends when the threat to the district is controlled, even if the fire continues outside the district (e.g., on federal land).

DNR takes a decentralized approach to fire suppression

DNR is responsible for direct fire suppression on state and privately owned forest lands subject to forest fire protection assessments. The agency delegates fire suppression and most supporting business operations to its six regions:

- Each of its six regions manage firefighting responsibilities, including dispatch and business operations, within the regional boundaries. The regions operate autonomously, but share firefighting staff and equipment during the fire season. A map of the regions is in Appendix 1.
- DNR also has a central wildfire division that provides support to the regions, negotiates agreements with federal agencies, and manages out of state dispatches.

2. Agreements govern cost sharing

Procedures are in place to share costs of large fires according to the terms of a master agreement

The Legislature asked JLARC staff to determine how the Department of Natural Resources (DNR) and the State Fire Marshal (Fire Marshal) share costs for fire suppression with federal and other agencies.

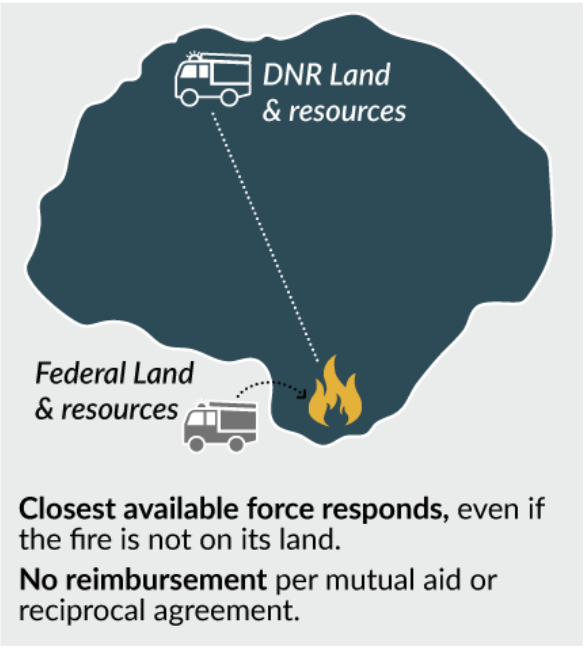
Initial response: Response provided without reimbursement

Under mutual aid agreements, agencies help one another at no cost during the initial response (about one work shift). Between state and federal agencies, this is known as reciprocal response, rather than mutual aid.

DNR has agreements for initial response and mutual aid with local fire agencies. Each DNR region manages the agreements with local fire agencies within its boundaries. The state's master agreement with federal agencies and Oregon includes reciprocal response.

Mutual aid and reciprocal response agreements are common nationwide. The underlying assumption for the agreements is that over time, all agencies mutually benefit, and that the approach helps to keep fires from growing. In fact, a common measure for wildfire agencies, including DNR, is to keep at least 95 percent of fires under 10 acres.

Exhibit 2.1: Initial Response



Extended response: Master agreement between federal agencies, Washington, and Oregon governs cost-sharing

Large fires often cross jurisdictional boundaries and involve resources from many agencies. Washington is party to a master agreement negotiated between the state, Oregon, and federal agencies that governs response and cost sharing. DNR is the state's signatory to the agreement. Both DNR and the Fire Marshal participate in cost sharing discussions with other agencies.

The agreement identifies how agencies can share costs and provides guidelines for use. The agencies mutually choose the cost-sharing method for each fire and document the decision in a fire-specific agreement. This approach is standard practice across the country. JLARC staff found that for a sample of fires between fiscal years 2010 and 2016, costs were shared according to guidance from the master agreement, as well as provisions in fire-specific agreements.

DNR, the Fire Marshal, and federal agencies have separate agreements with local fire agencies, other state agencies (Washington and other), and private vendors to provide supplies and services during a fire (see Section 3 for additional detail). Additional agreements address cost sharing and responses with other states (e.g., Idaho) and Canada.

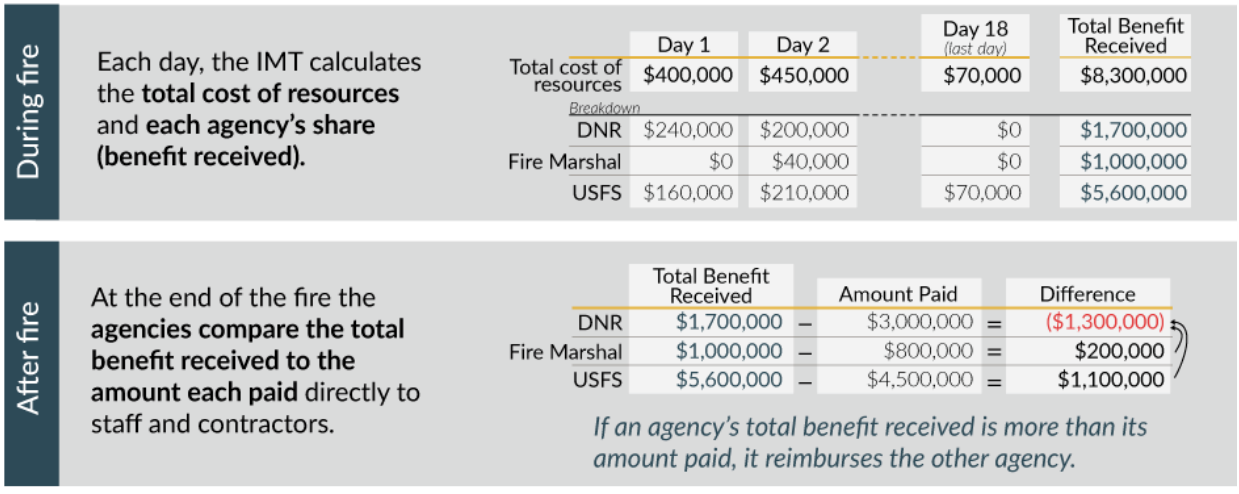
Agencies report that their preferred cost-sharing method for large fires is based on the benefit received by each agency

In interviews, staff from DNR, the Fire Marshal, and the U.S. Forest Service (USFS) reported that they prefer to use a cost-sharing method called "percent of effort." It has the following elements:

- **Pay for Benefit Received:** Each agency pays a percent of the cost based on the resources expended on its lands (benefit received). Both federal and state staff stated that they consider this to be the fairest approach.
- **Based on Estimated Total Costs:** While each agency will pay staff and contractors it hired for actual costs, the cost-sharing approach is based on estimated total costs. DNR, the Fire Marshal, and the USFS report that they use estimates because it improves efficiency, and that waiting for actual expenditures could delay reimbursement by months or years. JLARC staff identified that some states also use estimates, while others use actual expenditures for cost sharing.
- **Post-Incident Review:** DNR regions and the U.S. Forest Service reported that the cost share calculation and supporting documentation are reviewed post-incident for accuracy, and that the process can take months for large fires. While neither DNR nor the Fire Marshal have agency-wide policies and procedures for conducting post-incident reviews, JLARC staff found records of those reviews when we analyzed fire incident records.

Since agencies pay a portion of the cost directly, this cost-sharing practice can reduce the amount of interagency reimbursements. For example, at the Mills Canyon fire shown below, the USFS received a total benefit of $5.6 million. But, it paid an estimated $4.5 million directly to staff and contractors, so its reimbursement to DNR was $1.1 million.

Exhibit 2.2: Each agency pays a percent of the cost based on the resources expended on its lands (benefit received). The 2014 Mills Canyon fire offers a real-life example.

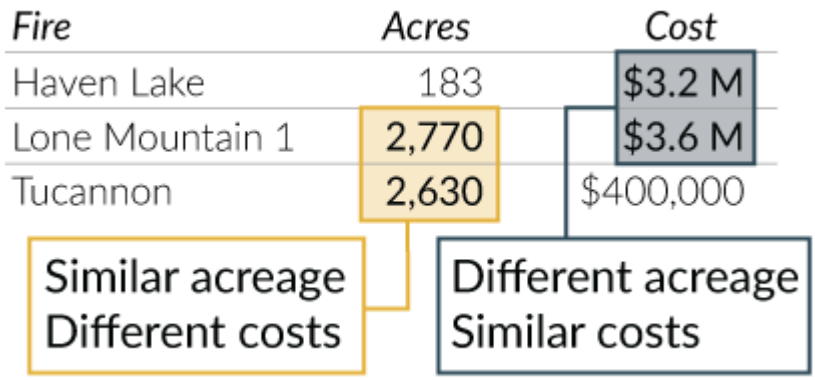


Source: JLARC staff depiction of master agreement and Mills Canyon fire records.

Acres burned may not be a reliable method for understanding or sharing costs

The master agreement states that sharing costs based on acres burned is allowed but not preferred. Different types of land require different suppression efforts. The efforts vary in cost. For example, a fire line built with bulldozers has a different cost than one built by a hand crew. Both differ from dropping retardant from an aircraft. The effort related to these methods may have little to do with the size of the fire. As a result, acres burned may not be a good indicator of cost. Likewise, suppression cost per acre on its own is unlikely to be a useful measure for understanding cost.

Exhibit 2.3: Acres burned may not be a good indicator of suppression costs



Source: Northwest Interagency Coordination Center Annual Reports 2014 and 2015. Data reflects acreage and estimated costs for all agencies before cost share or reconciliation.

3. Funds are appropriately spent on fires

DNR and Fire Marshal can show they appropriately spent funds on fire-related activities

The Legislature asked for information about fire suppression funding and costs for the Department of Natural Resources (DNR) and the State Fire Marshal (Fire Marshal). Below is a review of how each agency estimates costs of fires or mobilizations, the types of expenditures included, and whether expenditures are related to fires.

Agencies have different approaches for estimating costs of fires

DNR and the Fire Marshal routinely have expenditures that exceed their base appropriations for fire suppression or mobilization. The Legislature fully funds the work with supplemental and special appropriations. This approach is used by other western states and British Columbia.

Both agencies use a combination of actual and estimated expenditures in their supplemental requests:

- **DNR manually compiles estimates from at least four different data systems**, and makes adjustments based on the professional judgment of division and regional staff. This process is complicated by DNR's approach to documenting incident codes *(DNR may assign multiple codes to single fire and lacks a list of all codes)* (see Section 5). The estimates do not include any reimbursements expected from the cost share for large fires or fire complexes. A complex is multiple fires combined under a single incident command structure.
- **The Fire Marshal creates estimates from spreadsheets** that track the resources for each mobilization. These spreadsheets are based on time sheets, resource orders, agreements, and other source documentation.

Like all state agencies, DNR and the Fire Marshal submit their initial supplemental budget requests in September, before the end of the fire season. At this point, much of the information is incomplete. As the agencies update the information, the costs of some fires change, even if the overall fire season estimate stays relatively stable. Reasons for the changes include updating estimates with actual costs, shifting costs between fires within a fire complex *(A complex is multiple fires combined under a single incident command)*, and changes to the state's portion of the cost share *(Cost share calculation and supporting documentation are reviewed for accuracy after the incident. See Section 2)* during the post-incident review.

Agencies have procedures to track actual fire costs separately from other expenditures

DNR and the Fire Marshal each use budget codes and management procedures to track fire-related expenditures and help ensure that costs can be associated with a fire, fire activity (e.g., prepositioning *(Strategically positioning resources before a fire.)*), or mobilization. For example:

- Each agency has a set of high-level codes that indicate expenditures are related to fire or mobilization.
- Each agency assigns a code to a fire, fire complex, mobilization, or other activity. Expenditures, including agency staff time, are charged to the code. Some DNR fires have multiple codes, as discussed in Section 5.
- For a large fire, each resource assigned to the fire is given a unique resource order number. For example, if a contractor provided two engines with crews, each would have its own number. The incident management team checks the number at the fire for accountability and tracking. Resources cannot be paid without the resource order number.
- Agency staff review invoices from contractors against documentation from the fire before payment. JLARC staff compared a sample of expenditures against source documentation and was able to verify the costs.

DNR and the Fire Marshal spent $434 million on fire-related activities between fiscal years 2010 and 2016

Fire-related activities include DNR's response to fires and false alarms, prepositioning (*Strategically positioning resources before a fire.*) resources based on weather and fire conditions, and the Fire Marshal's coordination of state mobilizations. Costs include firefighters and other personnel, aircraft, equipment, and camp supplies.

Exhibit 3.1: Annual spending by DNR and the Fire Marshal between fiscal years 2010 and 2016 (dollars in millions)

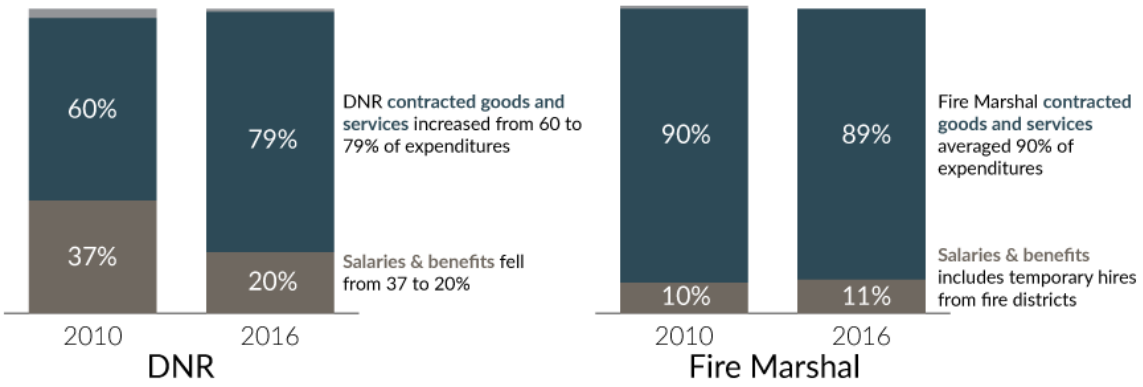
Agency	2010	2011	2012	2013	2014	2015	2016	Total	Notes
DNR	$26	$16	$13	$47	$31	$89	$146	$368	• Major fund sources are State General Fund, the Disaster Response Account, and the Budget Stabilization Account. • Contracted goods/services and salaries/benefits are the largest expenditure categories.
Fire Marshal	$2	$4	$4	$12	$3	$18	$22	$65	
Total	**$28**	**$21**	**$17**	**$59**	**$34**	**$107**	**$168**	**$434**	

Source: Agency Financial Reporting System (AFRS), dollars in millions. The totals may not match the sum of individual parts due to rounding. Fiscal years are July 1 through June 30, so fiscal year expenditures reflect fire activity in different calendar years. For example, expenditures for a fire in August 2015 are included in fiscal year 2016.

Majority of spending is on contracted goods and services, including contracts with local fire agencies

DNR and the Fire Marshal contract for services including suppression, fire camp operations, and equipment. Contracts — including those with local fire agencies — account for the largest portion of spending. Salaries and benefits are the second largest. For the Fire Marshal, most of the money spent on salaries and benefits is for volunteer firefighters who are temporarily paid as state employees during a mobilization,

Exhibit 3.2: Fire suppression and mobilization spending is largely contracts, salaries, and benefits



Source: Agency Financial Reporting System (AFRS) data, fiscal years 2010-2016.

DNR and the Fire Marshal establish agreements and rates with contractors before each fire season begins. In 2017, they began to use consistent wage and equipment rates. This avoids creating an incentive for contractors to work with only the higher-paying agency. DNR and the Fire Marshal also are beginning to use a federal system with lists of pre-approved contractors and negotiated rates.

Established procedures and controls are intended to prevent DNR and the Fire Marshal paying the same contractor for the same work

Contractors can work for different agencies at different times during a fire. There are procedures and controls in place at the fire intended to prevent a contractor from being paid by both DNR and the Fire Marshal for the same work. For example, the agencies use different resource order numbers when hiring contractors, and agency staff at the fire verify the hours worked and appropriate coding. Also, the resource order number changes at each fire.

Some expenditures are recouped from other agencies and responsible parties

The state has three ways to recoup suppression and mobilization expenditures: reimbursement from federal or other state governments, DNR's recoveries from private parties, and federal fire management assistance grants.

Exhibit 3.3: DNR and the Emergency Management Division (EMD) report that the state has recouped $72 million to date between fiscal years 2010 and 2016 for fire suppression

Source	Description	Credited to	Amount Received (FY10-16)
Reimbursement from **federal and state partners** (e.g., Oregon)	• Reimbursement under cost sharing agreements • Reimbursement for responses to out of state fires	• DNR receives reimbursement and recovery if it is paid in the same fiscal period as the fire. • Reimbursement received after the fiscal period is deposited into the State General Fund balance.	$34.6 million
Recoveries from **private parties** that negligently start fires	• May be paid from homeowner's insurance policies • May not recover full cost of suppression		$2.9 million
Fire Management Assistance Grants (FMAG) from the Federal Emergency Management Agency (FEMA)	• Reimburse 75% of eligible expenditures • Limited to fires that threaten to become a major disaster: 37 fires declared to be FMAG eligible between FY 2010-16	Deposited directly into the State Disaster Response Account.	$34.5 million

Sources: Reimbursement and recovery figures provided by DNR, FMAG data provided by the Emergency Management Division (EMD).

Costs may be recouped after the fiscal period in which the fire took place

There are multiple reasons that reimbursements may be submitted after the fiscal period in which the fire occurred. For example, fires can happen near the end of the fiscal year, agencies may need to review cost share documentation, or a cost recovery may be litigated. The time lag for reimbursements and recoveries makes it difficult to determine the actual cost of any fire season or fire.

The Emergency Management Division (EMD) of the Washington Military Department is responsible for submitting FMAG applications for the state. As of June 2017, the state had received partial FMAG reimbursement ($3.8 million) for fires that took place in the 2014 through 2016 fire seasons. EMD has not yet submitted some requests and others are awaiting FEMA review and approval. EMD reports that requests may be delayed due to the complexity of the application, number of fires, volume of records, delays in federal documentation, and competing operational responsibilities.

Local governments also may receive FMAG reimbursement. EMD has processed, and FEMA has paid, reimbursements for some local fire agencies and governments.

4. Data improvements needed

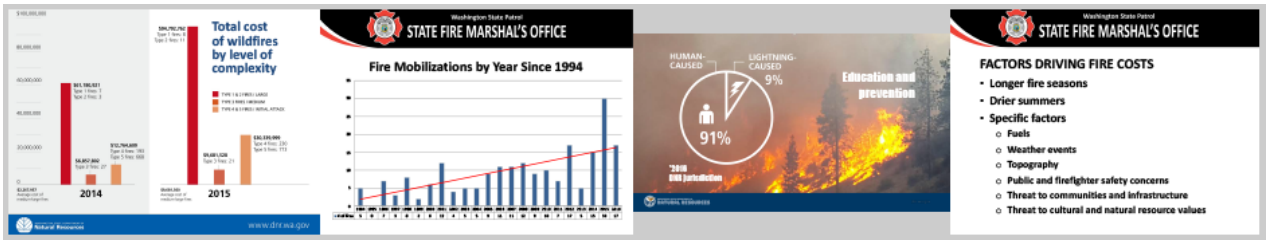
Accurate and refined data collection is needed to improve information about costs and characteristics

DNR and the Fire Marshal prepare public reports and respond to legislative questions about costs of fires and mobilizations

Like other state fire agencies and the U.S. Forest Service (USFS), the Department of Natural Resources (DNR) and the State Fire Marshal (Fire Marshal) are frequently asked to provide information on fire season characteristics (e.g., location, cause, acres burned) and costs. While fire characteristic data is not needed for agency budget requests, it can inform policy discussions.

DNR staff reported that, over time, the agency has added fire characteristic fields to its data system in response to inquiries from individual legislators. However, this data has not been consistently maintained and is not used for management purposes.

Exhibit 4.1: DNR and the Fire Marshal present information about costs and characteristics to the Legislature



Source: DNR and Fire Marshal presentations to the Legislature, 2016.

The State Fire Marshal keeps records of its mobilizations

The Fire Marshal coordinates state mobilizations to help local fire agencies, and does not directly fight fires. There were 93 mobilizations from fiscal year 2010 through fiscal year 2016.

When a local fire agency requests a mobilization, the Fire Marshal receives initial fire characteristic data such as the location, complexity, size, and values (homes, infrastructure) at risk. The Fire Marshal staff reported that they file this information with other mobilization documents, but do not update it during or after the mobilization. The agency also has access to reports completed at each mobilization by the fire Incident Management Team. The Fire Marshal staff reported that the agency periodically uses characteristic data from these reports for internal and external reporting.

While the Fire Marshal maintains basic information about mobilizations (e.g., county, cost), it does not have a system to compile and report details about the mobilization (e.g., structures threatened or destroyed).

DNR's data on fire characteristics is often unreliable, incomplete, or unused

DNR is responsible for directly fighting fires. Due to the size and scale of its responsibilities, DNR is the state agency with the most information on wildfire characteristics.

Like agencies across the country, DNR reports characteristics of large fires to the National Wildfire Coordinating Group (NWCG). DNR does not always update its own data systems, so its information may either match or contradict NWCG data.

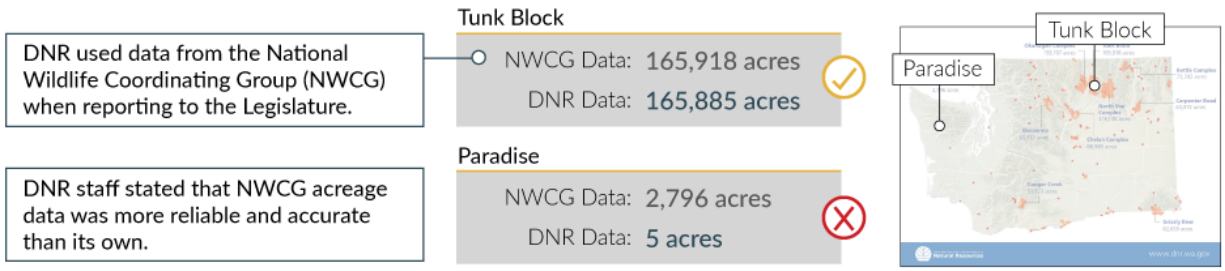
Concerns with DNR's data systems and data entry protocols

DNR collects fire characteristics for large and small fires in a database called Emergency Incident Report System (EIRS). It is a reporting system that is not used to manage fire suppression or track actual costs. The system has over a hundred fields, and staff consistently reported that most data is unused.

There are limited internal controls over data entry and updates. As a result:

- **Basic characteristic data such as acres burned and incident type can be unreliable**. EIRS entries may reflect the number of acres at the start of a fire, end of fire, or a point in between. DNR stated that the NWCG data for total acreage is more reliable than its own. DNR region staff also reported that they use different approaches for counting and classifying false alarms *(A report where a response was dispatched but no fire was found, or a controlled fire not requiring suppression.)* and fires that require limited response (e.g., extinguishing a campfire).
- **Dozens of fields have incomplete data.** Data on land cover, structures damaged or destroyed, and why a fire escaped initial attack is often not entered into EIRS. DNR staff stated that some fields, such as tree species involved in a fire, remain incomplete because neither the regions nor headquarters use the data.
- **Some characteristics are unreliable or incomplete because staff lack guidance or appropriate choices.** DNR staff stated that fields such as bushels of wheat or timber board feet burned lack data because staff do not know how to calculate the value. Other fields have limited options. For example, only one agency can be entered in the jurisdiction field even though fires often burn across jurisdictional boundaries.

Exhibit 4.2: DNR's data about acres burned is unreliable



Source: DNR presentation to GGIT, January 2016. DNR data from EIRS.

DNR lacks an efficient way to identify the costs of individual fires

DNR has a financial reporting system called DataMart that is separate from EIRS. It tracks fire expenditures by project codes. Each fire may have one or more project codes assigned to it. DNR does not maintain a centralized list of project codes.

- **A fire may have more than one code for tracking costs and characteristics.** For example, DNR may need to separately track costs for federal reimbursement or may have a code for costs shared across a fire complex *(A complex is multiple fires combined under a single incident command).*
- **DNR lacks a single index of all project codes.** While one code per fire is always entered in EIRS, other codes are recorded in multiple locations. Codes may be in the fire box *(A physical box with the supporting documentation for the fire)* or in spreadsheets at headquarters or the region. The spreadsheets vary in format and content. Currently, the only way to match the fire name with all relevant project codes is to manually gather the information.
- **The full cost of a fire (or group of fires) cannot be identified without project codes from all locations.** DNR'S financial reporting system can be searched only by project code, not by fire name. Without a centralized list of project codes, there is no systematic way to identify costs. For example, to identify the costs of all fires with the highest complexity *(Fires are rated on a five point scale reflecting threat, fire behavior, and other factors. See Appendix 1.)* in fiscal year 2016, DNR would need to manually compile all project codes assigned to 38 different incidents (see Appendix 1).

Legislative Auditor recommends improving fire data collection and reporting

The Legislative Auditor makes three recommendations:

1. DNR should refine its collection of key data elements and seek input from the appropriate Legislative committees.
2. DNR should improve the accuracy and reliability of the key data elements it collects.
3. DNR should develop a systematic and verifiable way to identify the costs of individual fires.

You can find additional details on the Recommendations tab.

5. Factors affecting costs include development

While research identifies key factors that may affect fire costs, there is no specific research on Washington's fires

The Legislature requested information on how development, land ownership, and insurance affect fire suppression costs. To answer these questions, JLARC staff reviewed agency data and current research on suppression costs. The research can inform policy discussions about fires, but is not intended for budgeting or predicting fire costs.

Research indicates that development is one of several factors that may affect cost

Published research indicates that factors such as topography, weather conditions, fire size, and fuel buildup can influence the cost of a fire. Home construction in high fire-risk areas such as the wildland-urban interface (WUI) *(Areas where homes are built in forests, grasslands, or shrub lands that are otherwise undeveloped.)* also can affect the cost. In our literature search, JLARC staff noted that many articles and reports associate increasing fire costs with development in the WUI, but few estimate the magnitude of the relationship.

- Fire suppression costs can increase when homes are nearby. However, additional homes in a low-density area increase costs by a larger factor compared to areas that are already high-density.
- Additional effort spent protecting homes may reduce available resources for suppressing other fires. This may increase overall costs.
- Literature suggests (and Department of Natural Resources (DNR) staff reported) that suppression tactics on developed lands can be different than those employed on undeveloped lands. Tactics to prevent fire from reaching structures, such as digging a fire line in front of a home rather than taking advantage of a natural fire break like a road, may increase suppression costs.

Land ownership can affect suppression goals and land management decisions

Land ownership is not cited as a factor that directly affects fire suppression costs. But, ownership can affect decisions about how fires are fought. For example, DNR has suppression responsibility on state and private forest lands, while the U.S. Forest Service (USFS) is responsible for federally-owned land. The USFS has different fire management options, including discretion to allow remote fires to burn. Land ownership also influences land management decisions that can affect cost. That is, public and private landowners have discretion over preventive measures such as thinning trees, clearing debris, or creating fuel breaks *(A natural or manmade change in fuel (e.g., a gap in vegetation) that acts as a barrier so that fires be more readily controlled.)*.

Research reviewed by JLARC staff does not cite private insurance as a factor that influences fire suppression costs or activities

Existing research does not cite private insurance, such as homeowners insurance, as a factor that affects fire suppression costs. Information on fire insurance coverage is proprietary and not publicly available. It is impossible to determine from publicly-available information how many homeowners or landowners in Washington are covered for fire damage. JLARC staff found that fire insurance for timber is rare, and that only a small percentage is insured worldwide. In interviews, DNR staff told JLARC analysts that incident management teams do not inquire or know about insurance when deciding where and how to attack fires.

Still, homeowners insurance can play a role in other aspects of fire prevention and response:

- Some insurance companies may reduce fire risk through premiums and education. A 2016 study found that rate increases have not discouraged building in fire-prone areas, but that insurers are moving toward requiring safer landscaping standards or offering discounts for fire-safe practices.
- Some insurance companies in Washington contract with private fire-fighting companies to protect insured properties.
- If an insured homeowner negligently causes a fire, DNR may recoup fire suppression costs from the home insurance policy.

No research specifically focused on Washington's fires

The research cited above is national or focused on a few fires in specific states. To date, researchers have not focused on Washington, and the state has not contracted for such studies. Similar research likely could not be completed with the data Washington currently collects.

- Neither DNR nor the State Fire Marshal track home-building or other development data, so studies that rely on house locations cannot be replicated. Demonstrating a change in costs over time due to development would require historical data on homes in Washington's wildland-urban interface, which does not exist.
- DNR tracks whether the fire started on public or privately owned land, but this information is unreliable (see Section 4).

Appendix 1: DNR Fire Data

DNR has responded to nearly 11,000 incidents (FY 2010-16)

The Department of Natural Resources (DNR) tracks and reports the number of fires and other incidents by calendar year or "fire season." Since this study aimed to understand the relationship between incidents and costs, JLARC staff analyzed the data by fiscal year. As a result, figures may differ from other published reports.

DNR incidents include different types of fires and false alarms

DNR tracks fires by classification: Classified, Other Agency, Out of State, False Alarms, and Other Incidents/Unclassified Fires. Definitions are available below.

Exhibit A.1: DNR fires and other incidents, fiscal years 2010-16

Fiscal Year	Classified Fire Highest Complexity most difficult to contain	Classified Fire Lowest Complexity least difficult to contain	Other Agency Fires no imminent threat to DNR-protected lands	Out of State Fires	False Alarms	Other Incidents/ Unclassified Fires
2010	20	859	195	27	477	106
2011	14	523	93	76	321	93
2012	10	635	84	53	423	128
2013	19	794	150	42	483	146
2014	33	773	144	0	439	111
2015	40	1,010	148	0	638	124
2016	38	880	159	0	459	54
Subtotals:	**174**	**5,474**	**1,004**	**198**	**3,240**	**762**
Total Fires: 6,850						
Total False Alarms and Other: 4,002						

Source: JLARC staff compilation of DNR data. Highest complexity includes type 1, 2, and 3 fires. Lowest complexity includes type 4 and 5 fires. Complexity determined by DNR based on national rating scale.

Definitions of fires and other incidents

- **Classified fire:** An uncontrolled fire that requires suppression action to prevent it from spreading to, or burning, DNR-protected land.
    - **Complexity/Type:** Classified fires are further divided by complexity (or type). Complexity is different from a fire complex, which is a group of fires managed together. Fires are rated on a five-point scale that is used nationally. 1 is the most complex type of fire to contain. A Type 4 or Type 5 incident – the least complex – is typically contained during initial response. Many factors determine the complexity of an incident, including area involved, threat to life and property, organizational complexity, jurisdictional boundaries, values at risk, fire behavior, strategy and tactics, and agency policy.
- **Other agency fires:** A fire burning on another agency's jurisdiction that does not pose an imminent threat to DNR-protected lands. DNR supplies suppression resources through agreements or closest forces concept.
- **Out of state fires:** A fire burning outside of Washington for which DNR supplies suppression resources through agreements.

DNR also tracks incidents for which there is no suppression action required, but staff or a partner agency responded:

- **False alarm:** A report where a response was dispatched but no fire was found, or a controlled fire not requiring suppression.
- **Other incidents/Unclassified fire:** Fires that have gone out naturally, fires started and extinguished as prescribed burns, and other fires (e.g., campfires) that cannot spread or threaten DNR land because of weather and fuel conditions.

Number of DNR classified fires by region

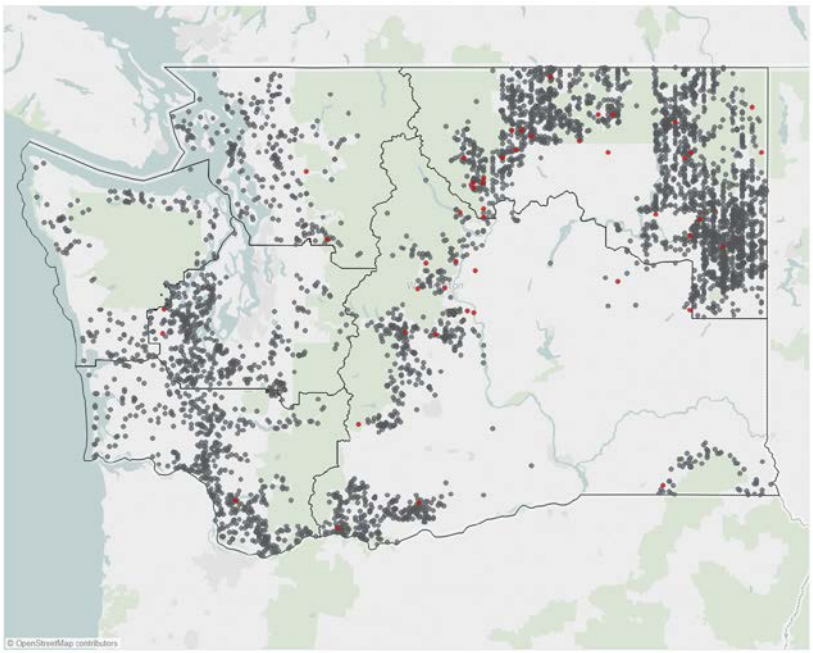
Each of DNR's six regions manage firefighting responsibilities, including dispatch and business operations, within the regional boundaries.

The following map shows the starting location of DNR classified fires between fiscal years 2010-2016. Blue and gray dots indicate fires with the lowest complexity, while red/orange dots are the highest complexity. Other agency fires (e.g., fires on federal land), false alarms, and other incidents are not shown.

Exhibit A.2: Classified DNR fires by region, fiscal year 2010 through 2016

Click this link for an interactive map. Map includes only fires with sufficient location data, so totals will not match table above.

DNR Region	Fiscal Year	Fire Complexity	
		Highest	Lowest
Northeast	2010	1	456
	2011	2	249
	2012	1	283
	2013	4	366
	2014		386
	2015	6	497
	2016	16	433
Northwest	2011		2
	2012		42
	2013		60
	2014		46
	2015		43
	2016	2	60
Olympic	2011		2
	2012		39
	2013		35
	2014		15
	2015		30
	2016		24
Pacific Cascade	2011		5
	2012		113
	2013		136
	2014		122
	2015		143
	2016	1	135
South Puget Sound	2011		3
	2012		44
	2013	1	65
	2014		39
	2015	1	117
	2016		133
Southeast	2011		17
	2012	1	110
	2013	2	134
	2014	5	165
	2015	4	188
	2016	1	123



Source: JLARC staff presentation of DNR data. Other agency fires (e.g., fires on federal land), false alarms, and other incidents are not shown.

Note: While each fire is assigned a region in DNR's database, they may have missing or inaccurate coordinate information. Some fires cannot be mapped, while others include a region code that may not match the location coordinates.

Appendix 2: Mobilization Data

The Fire Marshal coordinated 93 mobilizations (FY 2010-16)

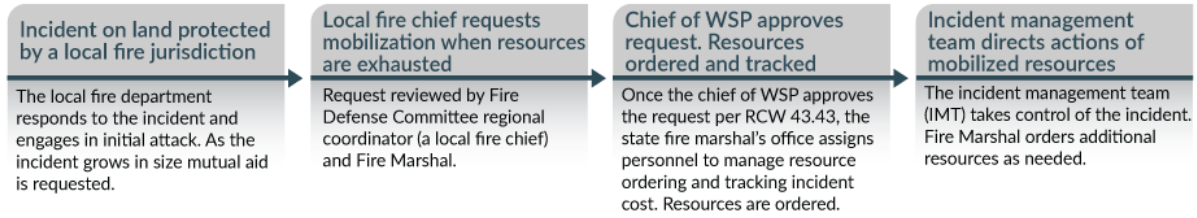
Mobilization: The use of fire service resources from throughout the state to support a local fire agency

The Washington State Fire Services Resource Mobilization Plan is authorized under RCW 43.43.961 to coordinate fire service resources during fires and disasters.

The Chief of the State Patrol authorizes mobilizations when they meet the criteria in statue and the mobilization plan. The State Fire Marshal (Fire Marshal) is part of the State Patrol and coordinates state mobilization.

Mobilization is used when “a local fire jurisdiction and/or region has expended or will expend, all available local and mutual aid resources in attempting to manage fires, disasters, or other events that jeopardize the ability of a jurisdiction and/or region to provide for the protection of life and property." State mobilization is not a replacement for local mutual aid. Jurisdictions that can request mobilization include local fire departments, fire districts, port districts, and regional fire protection service authorities. This report collectively calls them "fire agencies."

Exhibit A.3: Mobilization authorization and process



Source: JLARC staff depiction of mobilization process, based on 2017 Mobilization Plan.

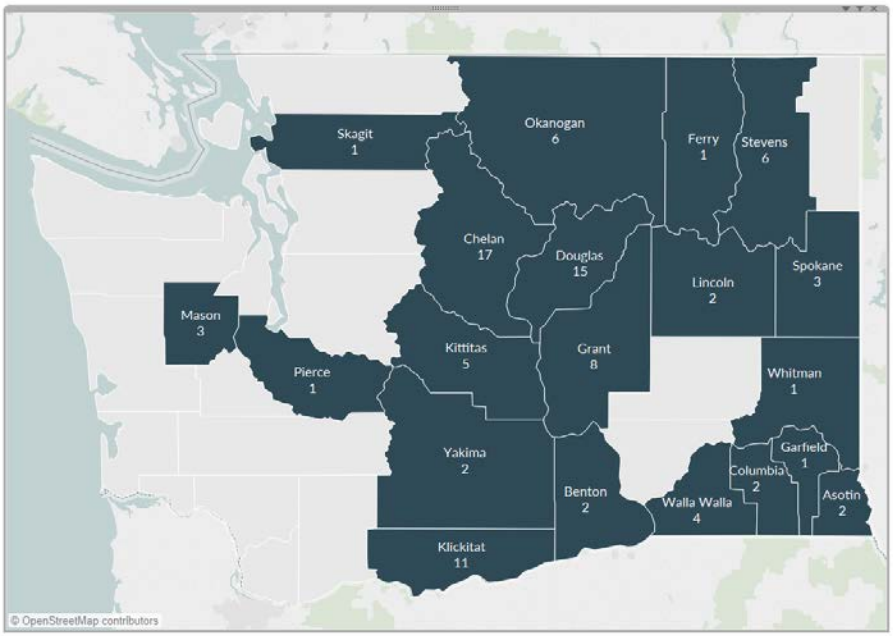
The Fire Marshal counts mobilizations

The Fire Marshal tracks and reports the number of mobilizations by calendar year or "fire season." Since this study aimed to understand the relationship between incidents and costs, JLARC staff analyzed the data by fiscal year. As a result, figures may differ from other published reports.

Exhibit A.4: 93 State Fire Marshal fire mobilizations in 20 counties, fiscal year 2010 through 2016

Click this link for an interactive map.

Fiscal Year	
FY 2010	8
FY 2011	10
FY 2012	8
FY 2013	17
FY 2014	6
FY 2015	18
FY 2016	26



Source: JLARC staff analysis of State Fire Marshal data.

RECOMMENDATIONS & AGENCY RESPONSE

Legislative Auditor Recommendation

The Legislative Auditor makes three recommendations to improve fire data collection and reporting

Recommendation #1: DNR should refine its collection of key data elements and seek input from the appropriate Legislative committees

DNR should identify the key data elements it needs for internal management and for responding to the most common information requests. This will likely revise the current list of data collected, and some information may no longer be needed. The agency should propose its list of data elements to the appropriate legislative committees of the House and Senate to ensure the data will meet legislative needs. DNR should plan to periodically review this list internally and with the Legislature on an ongoing basis.

Legislation Required:	None
Fiscal Impact:	JLARC staff assume DNR can implement this recommendation within existing resources
Implementation Date:	April 2019
Agency Response:	To be included with Proposed Final Report

Recommendation #2: DNR should improve the accuracy and reliability of the key data elements it collects

After DNR has refined the data elements it will collect (as described in the prior recommendation), it should implement agency-wide policies and procedures for data entry and validation to ensure that the data collected and reported is accurate and reliable.

Legislation Required:	None
Fiscal Impact:	JLARC staff assume DNR can implement policies and procedures within existing resources
Implementation Date:	December 2019
Agency Response:	To be included with Proposed Final Report

Recommendation #3: DNR should develop a systematic and verifiable way to identify the costs of individual fires

There are a variety of ways that DNR can achieve this, from simple to complex. For example, methods could include a single spreadsheet-based index of all project codes, adding fields to existing databases, or creating an interface between the financial and fire data systems. DNR also should consider having a consistent set of fields for the spreadsheets used to track fire codes at the regions.

Any approach should ensure that the list of codes is consistently maintained and updated throughout the fiscal year to improve the efficiency and accuracy of reporting.

Legislation Required:	None
Fiscal Impact:	JLARC staff assume DNR can implement policies and procedures within existing resources
Implementation Date:	June 2018
Agency Response:	To be included with Proposed Final Report

Agency Response

Agency response(s) will be included in the proposed final report, planned for January 2018.

MORE ABOUT THIS REVIEW

Audit Authority

The Joint Legislative Audit and Review Committee (JLARC) works to make state government operations more efficient and effective. The Committee is comprised of an equal number of House members and Senators, Democrats and Republicans.

JLARC's non-partisan staff auditors, under the direction of the Legislative Auditor, conduct performance audits, program evaluations, sunset reviews, and other analyses assigned by the Legislature and the Committee.

The statutory authority for JLARC, established in Chapter 44.28 RCW, requires the Legislative Auditor to ensure that JLARC studies are conducted in accordance with Generally Accepted Government Auditing Standards, as applicable to the scope of the audit. This study was conducted in accordance with those applicable standards. Those standards require auditors to plan and perform audits to obtain sufficient, appropriate evidence to provide a reasonable basis for findings and conclusions based on the audit objectives. The evidence obtained for this JLARC report provides a reasonable basis for the enclosed findings and conclusions, and any exceptions to the application of audit standards have been explicitly disclosed in the body of this report.

Study Questions

Why a JLARC study of DNR and State Fire Marshal fire suppression costs?

In the 2016 Supplemental Operating Budget (2ESHB 2376), the Legislature directed the Joint Legislative Audit and Review Committee (JLARC) to review funding and costs for fire suppression and state mobilization of fire resources. The study includes the Department of Natural Resources (DNR) and the State Fire Marshal.

DNR fights fires on forest lands it protects and helps other agencies fight fires on their lands

DNR works to contain and extinguish fires on state and privately owned forest lands. It employs both permanent and seasonal staff for these fire suppression efforts. When needed,DNR may contract with other state agencies and private firms for additional staff, equipment, and services. Local fire districts and federal agencies also help fight fires on DNR protected land. DNR may reimburse agencies for this assistance. It also may exchange services by helping other agencies fight fires on lands they protect (e.g., federal forests). DNR also may receive reimbursement for helping other agencies.

State Fire Marshal mobilizes additional fire resources for local fire districts when needed

Local fire districts are generally responsible for suppressing fires on lands that are not owned or managed by DNR or federal agencies. The State Fire Marshal can mobilize additional resources when local fire districts and their firefighting partners are unable to suppress a fire on their own. This is called state fire resource mobilization.

If a local fire chief requests and receives approval for additional aid, the State Fire Marshal coordinates the deployment of firefighters and other resources from local, state, and federal agencies. The State Fire Marshal also sets up an Incident Management Team to manage firefighting efforts, and reimburses responding agencies with state disaster response funds.

State funds fire suppression in operating and supplemental budgets

The Legislature appropriates funds for DNR fire suppression and state fire mobilization efforts from the state's general fund, the disaster response account, and the budget stabilization account. Supplemental funding is routinely needed after each fire season to cover expenditures that exceed initial funding.

Study scope

As directed, this study will focus on fire suppression costs and funding. JLARC staff will analyze DNR's and the State Fire Marshal's processes for estimating costs, tracking and allocating expenditures, and seeking reimbursement. The study will not assess decisions about how to suppress fires, the cost of recovery after a fire, or the impact of fire prevention efforts on suppression costs.

Study objectives

This study will address the following questions:

1. How does the state estimate costs and fund fire suppression activities and fire resource mobilization efforts?
2. What are the types of fire suppression costs, and how are the costs for individual fires determined?
3. What resources are used and shared to suppress fires? How do DNR and the State Fire Marshal manage cost sharing agreements, determine the state's share, and secure reimbursement?
4. How do the following characteristics influence fire suppression costs or reimbursement?
    a. State, federal, and private land ownership (including land with private fire insurance)
    b. Whether land is developed or undeveloped

Timeframe for the study

Staff will present the preliminary report in December 2017 and the final report in January 2018.

Related JLARC study

JLARC staff are conducting a separate study of forest fire protection assessments. These fees are collected by DNR for fire prevention and preparedness, not suppression. The preliminary report for that study is due July 2017.

Methodology

The methodology JLARC staff use when conducting analyses is tailored to the scope of each study, but generally includes the following:

- **Interviews** with stakeholders, agency representatives, and other relevant organizations or individuals.
- **Site visits** to entities that are under review.
- **Document reviews**, including applicable laws and regulations, agency policies and procedures pertaining to study objectives, and published reports, audits or studies on relevant topics.
- **Data analysis**, which may include data collected by agencies and/or data compiled by JLARC staff. Data collection sometimes involves surveys or focus groups.
- **Consultation with experts** when warranted. JLARC staff consult with technical experts when necessary to plan our work, to obtain specialized analysis from experts in the field, and to verify results.

The methods used in this study were conducted in accordance with Generally Accepted Government Auditing Standards.

More details about specific methods related to individual study objectives are described in the body of the report under the report details tab or in technical appendices.

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